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QUANTITATIVE AND QUALITATIVE COMPOSITION OF THE BIRD COMMUNITY IN A GARDEN SUBURB OF HABANA (CUBA)

КАЧЕСТВЕННЫЙ И КОЛИЧЕСТВЕННЫЙ СОСТАВ ПТИЧЬЕГО СООБЩЕСТВА ЗАГОРОДНЕГО РАЙОНА НА ОКРАИНЕ ГОР. ГАВАНА (КУБА)

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Abstract

From April 12 to July 30, 1979 both qualitative and quantitative composition of the bird community in a garden suburb of Habana, the capital of Cuba, was studied. Using a linear method, altogether 21 bird species were found in the main belt 15 hectares in area (3,750×40 meters) during 10 censuses; six other bird species were found in the immediate neighbourhood. *Passer domesticus* was the most frequent species and its numbers were twice as high as those of all other species together. *Mimus polyglottos* was the second in numbers, followed by *Dives atroviolaceus, Quiscalus niger, Columbina passerina, Tiaris olivacea, Zenaida macroura* and *Tyrannus dominicensis*; seven other species were influent, while the remaining seven had dominance lower than 1 per cent. In April, the density was 493 individuals per square kilometer. The highest density was found in June, *viz.*, 690 individuals per km^2. In the breeding season (*i.e.*, from April to July) of 1979, the average density was 595 individuals per km^2. Members of the order *Passeriformes* dominated markedly (76.15 per cent) even over autochthonous species.

Introduction

No analysis of bird communities of large towns has been carried out on Cuba and only two papers deal with this problem in the neighbouring parts of North and Central America (Woolfenden & Rohwer 1969, Emlen 1974). For that reason the bird population of Habana was investigated.

Description of the Locality, Material and Methods

Investigations were carried out in the garden suburb Atabey, situated in the western part of Habana in the neighbourhood of the Zoological Institute of the Cuban Academy of Sciences. This suburb consists mostly of one- or two-storey houses situated in gardens. Houses with more storeys are rare. Numerous trees, mostly *Roystonea regia, Cocos nucifera, Colophyllum brasiliense* var. *antillanum* and *Casuarina equisetifolia*, are significant and very important for the breeding of birds. Many other trees, shrubs and herbs,

both utility and ornamental, autochthonous and introduced from different continents, are more important from the trophic point of view (nectar, fruits, insects). Because of the subtropical climate many of them are in blossom or bear fruits during the whole year and for that reason some bird species can breed nearly all the year round or even during the winter months *(e.g., Chlorostilbon ricordii, Crotophaga ani)*. Nevertheless, the birds breed mostly from April to July.

In 1979, censuses were carried out on April 12, April 19, May 3, May 11, May 18, May 25, June 15, June 30, July 13 and July 30. The census was carried out using the method of the main belt which was 40 meters wide and 3,750 meters long. A detailed qualitative analysis thus covered the area of 15 hectares. The birds were censused on a line which started near the Coronela settlement and ran through street 222, av. 23, street 218, av. 21 A, av. 19 B, street 214, av. 17 A, street 216, av. 15, av. 13, street 214, street 204, av. 15, stree 200, av. 17, street 206 to the crossing of av. 17 A and street 214 in the neighbourhood of the Zoological Institute of the Cuban Academy of Sciences. The censuses were carried out from 8 to 11 a.m. and the walking rate ranged from 1 to 1.5 km per hour. The weather was usually sunny, very hot and calm, *i.e.*, quite typical of the summer season on Cuba. Only during two out of the ten censuses (May 18 and 25, 1979) it was overcast with occasional showers. The air temperature (in shade) was constant on all census days and ranged from 28 to 30.5 °C.

The birds were recorded on the basis of visual observation. Bird voices were used as an indication of their presence in hidden places (in tree crowns, *etc.*); however, their determination was always verified optically. In the study area, *Mimus polyglottos* mimicked perfectly the voice of *Tyrannus dominicensis* and this could have resulted in an overestimation of the numbers of the latter.

On the first census of each month the whole line was passed once again after the nightfall to record nocturnal species. The census was carried out according to their calls.

In addition to birds occurring in the main belt, those observed in the so-called supplementary belts along its borders were recorded to obtain some supplementary data on species with a greater action radius and a lower density.

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Results

Altogether 27 bird species (scientific names and the appurtenance of local populations to subspecies according to Garrido & García 1975) were found in the study area; they can be classified into 5 groups:

(a) Species breeding directly in the main belt or in the neighbouring supplementary belt:

Order: *Falconiformes*
Falco sparverius sparverioides Vigors, 1827
Order: *Columbiformes*
Zenaida macroura macroura (Linnaeus, 1758)
Columbina passerina aflavida (Palmer et Riley, 1902)
Order: *Cuculiformes*
Crotophaga ani Linnaeus, 1758
Order: *Strigiformes*
Tyto alba furcata (Temminck, 1827)*)
Order: *Apodiformes*
Chlorostilbon ricordii ricordii (Gervais, 1835)
Order: *Passeriformes*
Family: *Tyrannidae*
Tyrannus dominicensis dominicensis (Gmelin, 1788)
Family: *Mimidae*
Mimus polyglottos orpheus (Linnaeus, 1758)
Family: *Turdidae*
Mimocichla plumbea rubripes (Temminck, 1826)
Family: *Vireonidae*
Vireo altiloquus barbatulus (Cabanis, 1855)
Family: *Icteridae*
Quiscalus niger gundlachii Cassin, 1866
Dives atroviolaceus melanopsis (Wagler, 1829)
Agelaius humeralis humeralis (Vigors, 1827)
Family: *Fringillidae*
Tiaris olivacea olivacea (Linnaeus, 1766)
Passer domesticus domesticus (Linnaeus, 1758)

(b) Species foraging in the main belt but breeding elsewhere:

Order: *Ciconiiformes*
Ardeola ibis ibis (Linnaeus, 1758)*)
Order: *Caprimulgiformes*
Chordeiles minor gundlachii Lawrence, 1856*)
Order: *Apodiformes*
Tachornis phoenicobia iradii (Lembeye, 1850)*)

(c) Species breeding neither in the study area nor on Cuba:

Order: *Passeriformes*
Family: *Hirundinidae*
Hirundo rustica erythrogaster Boddaert, 1783
Family: *Parulidae*
Mniotilta varia (Linnaeus, 1766)
Dendroica palmarum palmarum (Gmelin, 1789)
Dendroica tigrina (Gmelin, 1789)
Setophaga ruticilla (Linnaeus, 1758) subsp.
Family: *Icteridae*
Icterus galbula (Linnaeus, 1758)

(d) Wanderer from a quite different environment:

Order: *Gruiformes*
Aramus guarauna pictus (Meyer, 1794)

(e) Species only circling above the locality and looking for food:

Order: *Falconiformes*
Cathartes aura aura (Linnaeus, 1758)*)

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*) see the following notes

Tab.1. Abundance, density, frequency

Species	IV.				V.							
	12		19		3		11		18		25	
	n	*A*	*n*	*A*	*n*	*A*	*n*	*A*	*n*	*A*	*n*	*A*
Agelaius humeralis	—	—	4	4.08	—	—	2	1.90	1	1.02	—	—
Ardeola ibis	3	6.00	3	3.06	.	—	—	—	—	—	—	—
Columbina passerina	6	12.00	10	10.20	2	1.98	11	10.48	6	6.12	6	6.12
Crotophaga ani	.	—	4	4.08	4	3.96	2	1.90	1	1.02	—	—
Dives atroviolaceus	11	22.00	24	24.50	27	26.74	22	20.96	18	18.37	14	14.29
Dendroica palmarum	2	4.00	—	—	—	—	—	—	—	—	—	—
Dendroica tigrina	—	—	—	—	1	0.99	—	—	—	—	—	—
Falco sparverius	—	—	—	—	—	—	—	—	1	1.02	—	—
Chlorostilbon ricordii	1	2.00	3	3.06	2	1.98	2	1.90	4	4.08	3	3.06
Icterus dominicensis	—	—	2	2.04	1	0.99	—	—	.	—	3	3.06
Icterus galbula	—	—	1	1.02	—	—	—	—	—	—	—	—
Mimocichla plumbea	1	2.00	3	3.06	2	1.98	2	1.90	3	3.06	1	1.02
Mimus polyglottos	9	18.00	14	14.29	24	23.76	27	25.72	21	21.43	29	29.60
Mniotilta varia	—	—	—	—	1	0.99	—	—	—	—	—	—
Quiscalus niger	4	8.00	7	7.14	19	18.81	16	15.24	15	15.31	21	21.43
Setophaga ruticilla	—	—	—	—	1	0.99	—	—	—	—	—	—
Tiaris olivacea	2	4.00	14	14.29	5	4.95	6	5.72	5	5.10	6	6.12
Tyrannus dominicensis	1	2.00	2	2.04	6	5.94	2	1.90	12	12.25	4	4.08
Tyto alba	2	4.00	2	2.04	2	1.98	2	1.90	2	2.04	2	2.04
Vireo altiloquus	1	2.00	.	—	.	—	6	5.72	3	3.06	2	2.04
Zenaida macroura	7	14.00	5	5.10	4	3.96	5	4.76	6	6.12	7	7.17
Total	50		98		101		105		98		98	

*Passer domesticus**) was the absolutely most abundant species. During the first census on April 12, altogether 102 individuals were found. The density was 67.10 per cent, *i.e.*, more than twice greater than that of all other birds together. Because of technical reasons this species could be recorded only on two dates during the following censuses, *viz.*, on May 25, *i.e.*, in the midst of the planned study period, and on July 30, *i.e.*, during the last, closing census. During the first census, 163 individuals were observed (d = 62.45 per cent); during the second one, 83 birds (d = 60.58 per cent). The average density of this species during the whole study period was 63.27 per cent.

The abundance of birds in the main belt is presentel in Tab. 1.**) It increased from the original 50 individuals recorded during the first census

*) To save place and to increase the reader's orientation in the text, only the binary scientific names are used in the following text.

**) With regard to the foregoing paragraph, *Passer domesticus* is not included in Tab. 1.

VI.				VII.				Σ	D%	Frequency	
15 n	A	30 n	A	13 n	A	30 n	A			Main belt only	Supplementary belt included
5	4.20	6	6.82	—	—	1	1.85	19	2.13	60	60
4	3.36	1	1.14	7	8.64	—	—	18	2.02	50	60
12	10.09	8	9.09	11	13.58	3	5.56	75	8.41	100	100
2	1.68	6	6.82	5	6.17	5	9.26	29	3.25	80	90
20	16.81	18	20.45	12	14.82	17	31.48	183	20.52	100	100
—	—	—	—	—	—	—	—	2	0.22	10	10
—	—	—	—	—	—	—	—	1	0.11	10	10
—	—	—	—	1	1.23	—	—	2	0.22	20	20
5	4.20	2	2.27	3	3.71	1	1.85	26	2.91	100	100
1	0.84	1	1.14	—	—	—	—	8	0.90	50	60
—	—	—	—	—	—	—	—	1	0.11	10	10
3	2.52	1	1.14	1	1.23	—	—	17	1.91	90	90
21	17.65	19	21.59	14	17.28	8	14.82	186	20.85	100	100
—	—	—	—	—	—	—	—	1	0.11	10	10
19	15.97	4	4.55	14	17.28	3	4.56	122	13.68	100	100
—	—	—	—	—	—	—	—	1	0.11	10	10
8	6.72	6	6.82	5	6.17	2	3.70	59	6.61	100	100
8	6.72	7	7.95	3	3.71	5	9.26	50	5.61	100	100
2	1.68	2	2.27	2	2.47	2	3.70	20	2.24	100	100
3	2.52	—	—	—	—	2	3.70	17	1.91	60	80
6	5.04	7	7.95	3	3.71	5	9.26	55	6.17	100	100
119		88		81		54		892	100.00	—	—

to 98 and remained on this or slightly higher level till the half of June when it began to decrease markedly. As it should theoretically increase due to the production of young, it must be expected that a part of its population migrated into a more distant neighbourhood, probably to localities with a better food supply. However, we were not able to study this problem within the allotted time and for that reason it will be necessary to pay special attention to it in future.

The number of species recorded during the successive censuses ranged from 12 to 15 (Tab. 1).*) Eleven (or 12) species with the frequency 80—100 were the constant part of the bird community. The fluctuating element included species which were constant and breeding in the belt but with

*) When analyzing the frequency we held for reasonable to consider not only species and individuals recorded in the main belt but also in the supplementary belt because some constant species, typical for this environment *(Falco sparverius, Crotophaga ani, Vireo altiloquus, Icterus dominicensis)* could be too underestimated due to their low density.

a low density and a greater action radius *(Falco sparverius, Icterus dominicensis, Agelaius humeralis);* species breeding in a nearby but considerably different environment (*i.e.,* in mangroves *Ardeola ibis*); migrating species (*Dendroica palmarum, D. tigrina, Icterus galbula, Mniotilta varia,* and *Setophaga ruticilla*); and a wanderer *(Aramus guarauna).*

This analysis did not naturally comprise species observed during censuses but showing no sufficiently close ecological relationship to the environment under study, *viz., Chordeiles minor, Tachornis phoenicobia, Hirundo rustica* (swallows caught insects in greater heights), *Cathartes aura* (vultures were looking for carrion from greater heights and landed only on more open places), and *Aramus guarauna* (a stray wanderer from a quite different environment).

From the viewpoint of dominance there were 7 dominant species (D > 5 per cent):

Mimus polyglottos
Dives atroviolaceus
Quiscalus niger
Columbina passerina
Tiaris olivacea
Zenaida macroura
Tyrannus dominicensis

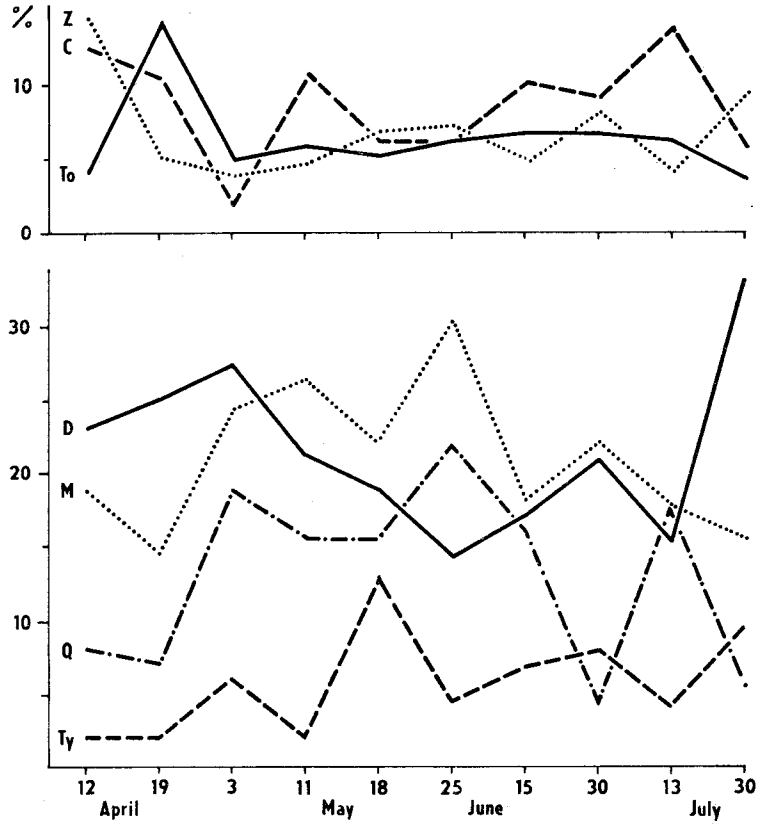

Fig. 1. Variation in the dominance of dominant species during the study period.
Explanations: Z, *Zenaida macroura;* C, *Columbina passerina;* To, *Tiaris olivacea;* D, *Dives atroviolaceus;* M, *Mimus polyglottos;* Q, *Quiscalus niger;* Ty, *Tyrannus dominicensis.*

7 influent species (D = 1 to 5 per cent)

Crotophaga ani
Chlorostilbon ricordii
Agelaius humeralis
Ardeola ibis
Mimocichla plumbea
Tyto alba
Vireo altiloquus

The remaining species were accessory (D < 1 per cent) and included mostly species not breeding on Cuba (*i.e.* only wintering or passing through). The only exception were two species with a low density (*Falco sparverius* and *Icterus dominicensis*).

This evaluation is based on a summarization of all ten censuses and the species are arranged in a descending order. Although the rank of the species changed on different censuses the value of the three most abundant species decreased occassionally in the case of *Quiscalus niger* below the value of 10 per cent (Fig. 1). In the group of four other species (*Columbina passerina, Tiaris olivacea, Zenaida macroura* and *Tyrannus dominicensis*) the abundance decreased below the limit of 5 per cent only in 22.5 per cent of cases.

From the viewpoint of appurtenance of the various species to higher systematic units the most important group [breeding species, see above sub (a)] involved, above all, members of the order *Passeriformes:* 10 species versus 6 species of non-*Passeriformes.* Their dominance was even more marked: in the total abundance of 868 birds in this group (although without

Tab. 2. Density per 1 km²

	IV.	V.	VI.	VII.	IV.—VII.
Agelaius humeralis	13.33	5.00	36.67	3.33	12.67
Ardeola ibis	20.00	—	16.67	23.33	12.00
Columbina passerina	53.33	41.67	66.67	46.67	50.00
Crotophaga ani	13.33	11.67	26.67	33.33	19.33
Dives atroviolaceus	116.66	135.00	126.67	96.67	122.00
Dendroica palmarum	6.66	—	—	—	1.33
Dendroica tigrina	—	1.67	—	—	0.66
Falco sparverius	—	1.67	—	3.33	1.33
Chlorostilbon ricordii	13.33	18.33	23.33	13.33	17.33
Icterus dominicensis	6.66	6.67	6.67	—	5.33
Icterus galbula	3.33	—	—	—	0.66
Mimocichla plumbea	13.33	13.33	13.33	3.33	11.33
Mimus polyglottos	76.67	168.33	133.33	73.33	124.00
Mniotilta varia	—	1.67	—	—	0.66
Quiscalus niger	36.67	118.33	76.67	56.67	81.33
Setophaga ruticilla	—	1.67	—	—	0.66
Tiaris olivacea	53.33	36.67	46.67	23.33	39.33
Tyrannus dominicensis	10.00	40.00	50.00	26.67	33.33
Tyto alba	13.33	13.33	13.33	13.33	13.33
Vireo altiloquus	3.33	18.33	10.00	6.67	11.33
Zenaida macroura	40.00	36.67	43.33	26.67	36.67
Average density in successive months	493	670	690	450	595

Passer domesticus which was recorder only during three actions), 661 individuals belong to the order *Passeriformes* (*i.e.*, 76.2 per cent).

The evaluation of density is presented in Tab. 2. This is a summarization for successive months. The density increased from April (493 individuals per 1 km^2) to June (690 per 1 km^2). A considerable decrease observed in July was probably due to a part of the population having migrated to other localities after the end of the breeding season as mentioned above. This migration was also described in different foreign studies. During the whole study period of four months (IV.—VII.) the average density was 595 individuals per 1 km^2.

Notes on some species:

Ardeola ibis. The nearest breeding colony known to us was at the Santa Ana River in the western part of Habana.

Cathartes aura. Turkey Vultures (1 to 4 birds) circled daily over the study area; to feed, however, they landed only in more open places, *e.g.*, a large dust-heap near the Coronela settlement, sidewalks of wide avenue 23, a large citrus plantation 10 hectares in area, *etc.* No Turkey Vultures were observed only during some several-day-long periods, indicating their concentration on a fresh carrion.*) On the other hand, 88 birds were observed above the main belt prior to a storm on April 22.

Chordeiles minor. It was observed flying over the main belt during the evening excursions. Less than one kilometer apart from here, in the Coronela settlement where one of the authors (Balát) lived, one pair of these birds occurred daily at sunset and flitted over a rather small area till daybreak. However, this was probably another pair. Nests of this species are usually on the ground (G u n d l a c h 1893, B a i l e y 1925) but G o o d e r s (1969) mentioned that it "... has taken advantage of the nesting sites provided by the flat, gravelled roofs characteristic of North American city buildings." Within the study area there were both possibilities of nesting but the species was not presented in Tab. 1 because no nests were found.

Tachornis phoenicobia. The nearest nesting site known to us was at El Salado Beach, westward from Habana.

Tyto alba. This species was also observed during special night excursions only. One pair nested in the crown of a dry palm tree, *Roystonea regia,* near the administration building of the Zoological Institute of the Cuban Academy of Sciences, *i.e.* in the very main belt. For that reason it was presented in Tab. 1 as a species staying in the given locality. In the Coronela settlement (in the distance of about 1.5 km) another pair was observed and/or recorded by its call during the whole study period nearly every evening.

Discussion

The possibilities to compare our results with literary data are very limited. There were no similar studies in the area investigated. Only two North American studies can be consulted in this direction. W o o l f e n d e n & R o h w e r (1969) studied bird populations in the residential suburbs of St.

*) To the end of March, 1979, 36 Turkey Vultures were observed around two carrions of *Canis familiaris* in Sierra del Rosario; none circled the sky for two days.

Petersburg and Gulfport, Pinellas Country, Florida, and Emlen (1974) studied an urban bird community in Tucson, Arizona. The Florida locality was not only more similar to Cuba from the geographical point of view but also its area and partly its character of vegetation and build-up corresponded with our study area in Habana. The composition of the avifauna in the Tucson locality was very different due to the different geographic situation, a smaller extent of verdure (mostly shrubs and very few trees) and a much denser build-up.

However, there was an interesting coincidence in the case of the species *Passer domesticus*. The density of this introduced species was in all cases higher than that of any other autochthonous species. In our study it ranged from 60.50 to 67.10 per cent during the breeding season, while on Florida (Woolfenden & Rohwer l. c.), in an environment dominated by the longleaf pine *(Pinus palustris),* it was 41 per cent and in that dominated by turkey oaks *(Quercus laevis)* and laurel oaks *(Q. hemisphaerica),* 54 per cent. In a more built-up urban environment in Tucson, Arizona (Emlen l. c.), the annual average was 44.96 per cent.

As far as the other species are concerned, there were great differences in the species composition, dominance and density. In the table of species from Florida there were only two of eleven living also in our study area in Habana, *viz., Mimus polyglottos* and *Zenaida macroura.* In Habana, *Mimus polyglottos* was the second most frequent species after *Passer domesticus* (D = 20.85 per cent) while in Florida it was in the 2nd and 3rd place in areas dominated by *Pinus palustris* (D = 12.64 per cent) and *Quercus laevis* and *Q. hemisphaerica* (D = 12.94 per cent), resp. On the contrary, the species *Zenaida macroura,* which was in the 6th place in Habana (D = 6.17 per cent), represented more than a half of the autochthonous bird population in the pine plot (D = 54.15 per cent) and was far ahead of all other species; in the oak plot it was the 2nd most frequent species (D = 33.33 per cent) closely behind the species *Cyanocitta cristata* (D = 36.89 per cent). This species was dominant also in the former plot while in the latter it shared this position with *Richmondena cardinalis.* The other species showed a density lower than 5 per cent in both plots. In the Arizona table (Emlen *l. c.*) there were also only these two species common with Habana; they were, however, shifted back to the 4th and 6th place, resp., by the species *Scardoffela inca, Carpodacus mexicanus* and *Zenaida asiatica* (*Mimus polyglottos,* D = 6.43 per cent; *Zenaida macroura,* D = 4.02 per cent).

From the viewpoint of higher systematic units, the ratio between passeriform and non-passeriform species was rather similar in Habana, Arizona and in Florida's oak plot (9 : 6; 9 : 5 and 5 : 3, resp.). A greater difference was found only in the pine plot in Florida (8 : 3). Marked differences were found, however, only in quantities of the members of the two aforementioned groups. In our study area in Habana, *Passeriformes* formed 76.15 per cent of the bird population (only autochthonous species), while in Florida they made up only 43.32 and 61.17 per cent in the pine plot and oak plot, resp., and in Arizona 40.77 per cent of the bird population.

Summary

The qualitative and quantitative composition of the bird community in a garden suburb of Havana was studied during the breeding season of 1979.

(1) Using the line census method (length and with of the main belt 3,750 and 40 m, resp.), altogether 27 bird species were observed from April 12 to July 30; two thirds of them belonged to the order *Passeriformes*.

(2) *Passer domesticus* was the most frequent species; it was more frequent than all other species together (D = 60.58 to 67.10 per cent).

(3) Of the autochthonous species the following were the most frequent: *Mimus polyglottos, Dives atroviolaceus, Quiscalus niger, Columbina passerina, Tiaris olivacea, Zenaida macroura* and *Tyrannus dominicensis*. Seven species were dominant (excluding the introduced species, *Passer domesticus*) and, by chance, seven and seven were influent and accessory, resp. The dominance of the first species and mostly also of *Quiscalus niger* was extraordinarily marked during the whole breeding season.

(4) The members of the order *Passeriformes* markedly dominated (76.15 per cent, excluding the introduced species, *Passer domesticus*) over all other orders. In the urban environments of Florida and Arizona, however, the members of the order *Columbiformes* markedly dominated over other taxa.

(5) The average density during the breeding season (from April to July 1979) was 595 individuals per 1 km^2; it was the highest in June (690 birds per 1 km^2) and the lowest in July (450 birds per 1 km^2). In July, the birds probably migrated to other places with a better food supply.

Резюме

В период с 12-ого апреля до 30-ого июня 1979 года авторы исследовали качественный и количественный состав птичьего сообщества загороднего района на окраине столицы Кубы — гор. Гавана. На главной площадке длиной 3750 м и шириной 40 м (= площадью 15 га) авторы в 1979 году определили линейным методом в общем 21 вид птиц и в непосредственных окрестностях еще следующих 6 видов. Наиболее часто встречающимся видом оказался вид *Passer domesticus*, численность которого два раза больше чем всех остальных вместе взятых видов. Далее следуют в убывающем порядке численности виды *Mimus polyglottos, Dives atroviolaceus, Quiscalus niger, Columbia passerina, Tiaris olivacea, Zenaida macroura* и *Tyrannus dominicensis*, семь следующих видов оказались инфлюентными, в то время как доминантность следующих 7 видов была ниже чем 1 %. Численность популяций составляла в апреле 493 особей/км^2, в июне оказалась наивысшей и составляла 690 особей/км^2. Во время гнездования (IV-ый и VII-ой месяц вкл.) в 1979 г. составляла 595 особей/км^2. Даже среди автохтонных видов выразительно преварировали (76,15 %) особи рода *Passeriformes* над всеми остальными видами.

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